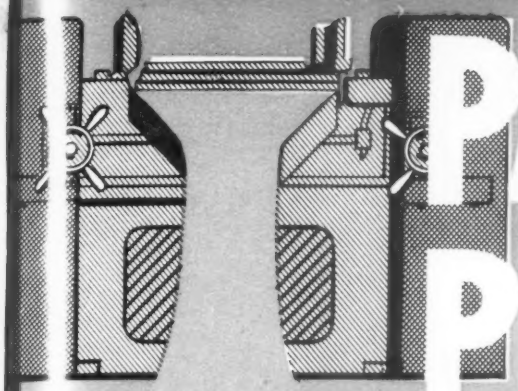

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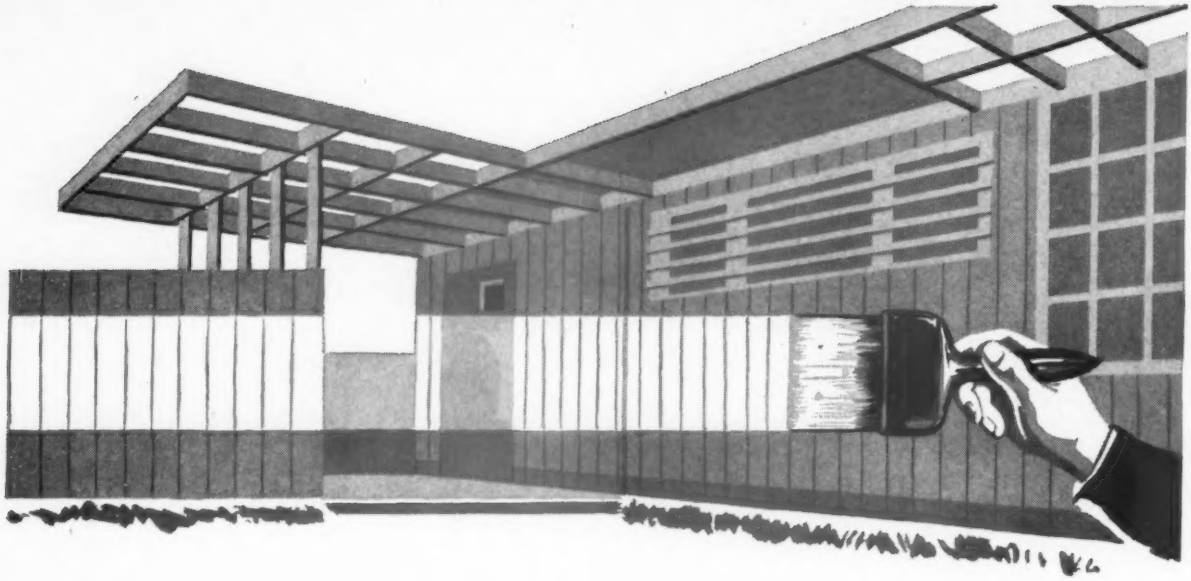

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PAINT and varnish PRODUCTION

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint & Varnish Record)

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Contents

Pyrolac's New Plant, *by Joseph Miller* 6
Fungicidal Varnishes and Lacquers, *by Sam Ruggeri* 8
28th Federation Convention 11
Hot Lacquers, Part II, *by Charles Bogin* 13
Rubber Base Paints, Part III, *by H. L. Rice* 15
62nd N. P. V. L. Ass'n. Convention 20
Calendar of Events 31
Technical Bulletins 32
Subject Index to Vol. XXX, Jan–Dec. 1950 33
Author's Index to Vol. XXX, Jan–Dec. 1950 33
Advertiser's Index 34

NEXT ISSUE

The January issue of Paint and Varnish Production will carry an interesting article on wax emulsions and their uses in wax coating materials. The author discusses such important factors as properties desired in wax coatings, methods for obtaining these properties, and formulation techniques. Also, included in this article is a complete discussion on various types of waxes covering physical and chemical properties and general uses.

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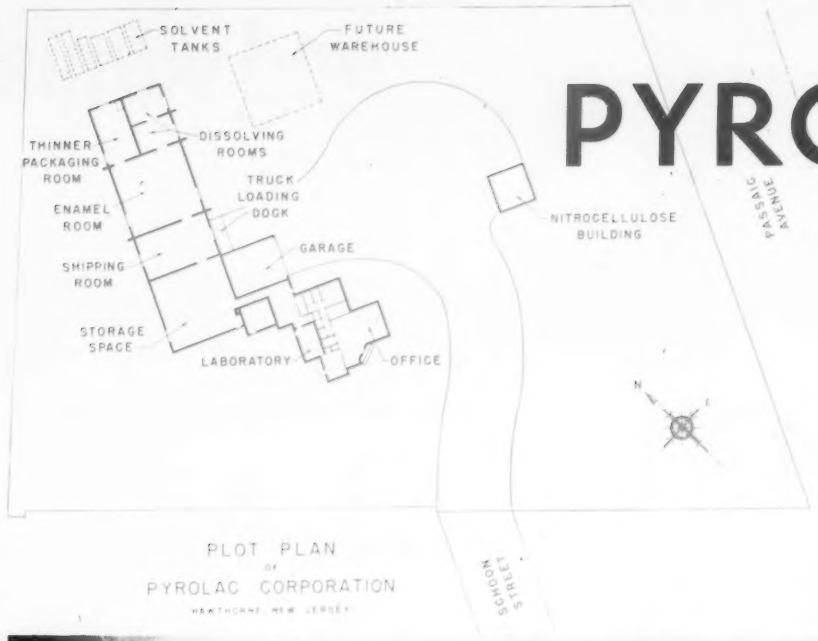
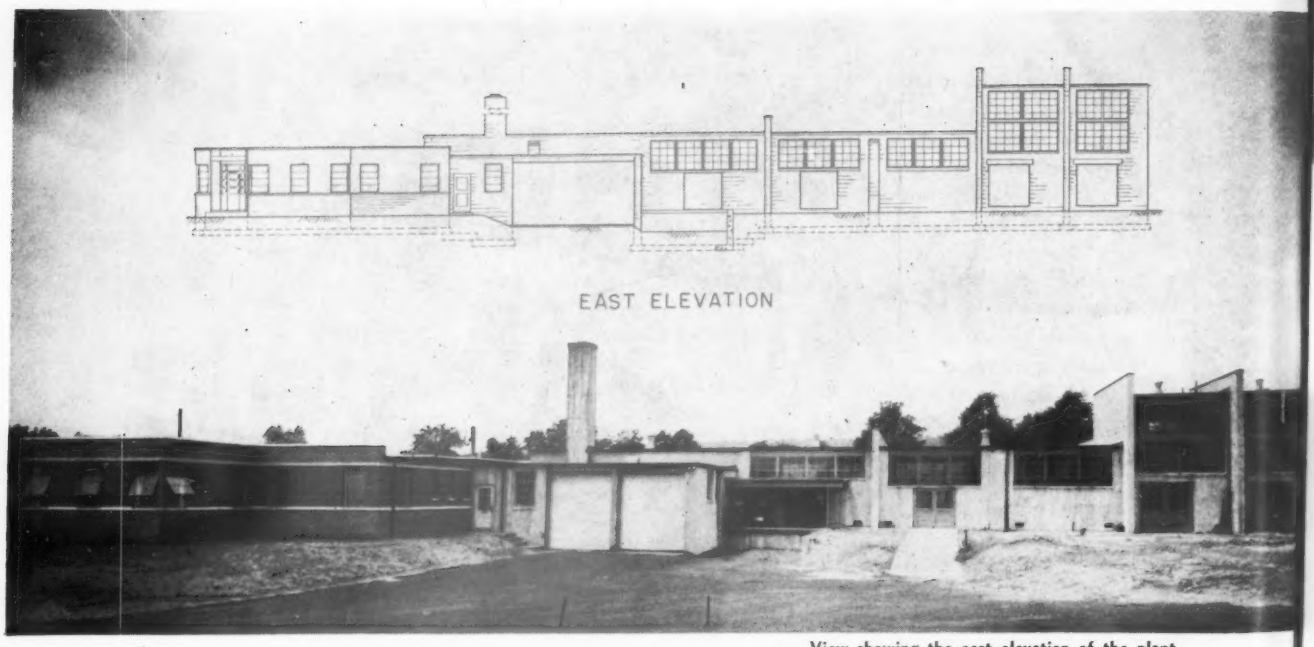
PYROLAC'S new plant

By Joseph Miller, President, Pyrolac Corp.





View showing the east elevation of the plant.

FEBRUARY 12, 1947, was a bad day for us, as our plant in North Bergen, New Jersey, was completely destroyed by fire. That experience was a trying one and created a host of problems. Fortunately, we were able to arrange for our production requirements at another lacquer manufacturers' plant, and continued at that plant until we completed and put our new facilities into operation early this year.

We were determined when rebuilding that we would have a plant with plenty of room (that is, ground space), and that we would design and build facilities incorporating those safeguards necessary to prevent our having another such loss.

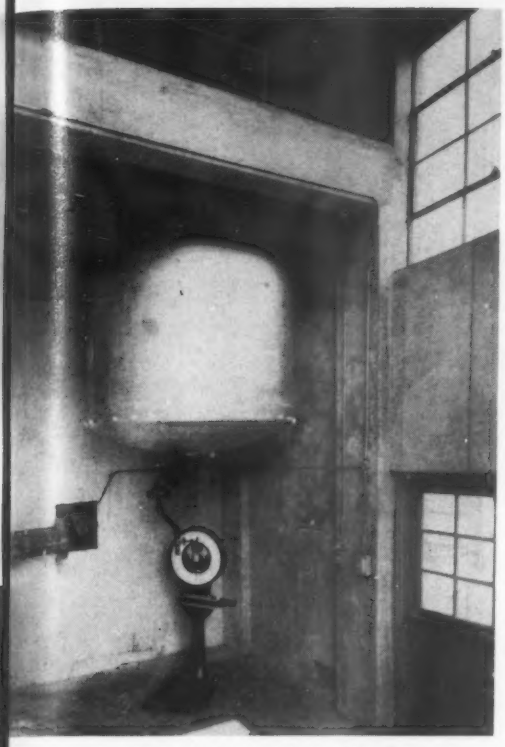
That plant has been built with the help offered us by *C. L. Jones, Safety Engineer, of the Hercules Powder Company.* It has now been in operation for some time, and this story tells what we have and of the safeguards provided.

Finding a suitable location wasn't easy. Lots of sites were available, but for our purpose there were usually some objections. Either the plot of land was too small, the location wasn't available to good transportation, or the water supply was not adequate for fire protection purposes, etc. Finally, we found what we wanted in Hawthorne, New Jersey; Figure 1 shows the plot of land and the buildings which comprise our new lacquer plant.

Layout

THE plot is about 2½ acres in extent; because of the way the facilities are laid out, they are well removed from any dwelling or other buildings in the vicinity. In other words, we are at safe distances from any such structures, and we also have ground space to put in additional facilities, as the needs develop.

The main building houses the sev-



View showing one of the 1400-gallon mixers.

eral manufacturing operations and the shipping room, office, laboratory, men's locker room, garage, heating plant, and storage.

Manufacturing operations are carried out in the northerly portion of the main building where they have been segregated and protected so as to minimize the possibility of fire or other accident. These arrangements reduce the possibility of business interruption, and at the same time provide protection for the people employed and the Public as well as for our property.

The "tank farm" is located north of the main building, and all of the tanks are underground. The solvents and diluents are delivered via tank truck, with the point at which such trucks park being at a reasonable distance from the plant. Thus, in the event of fire at a truck, the possibility of involving the entire plant is remote.

The pumping station at the northwest corner of the building transfers solvent from the underground tanks to the solvent room and to the mixers in the lacquer mixing and enamel rooms. Each solvent is automatically metered, or weighed as the occasion requires.

Nitrocellulose is stored in a building of masonry construction located as shown on the plan, and is trucked over to the manufacturing building as needed.

Resins, oils, pigments, plasticizers, containers, etc., are presently stored in one of the rooms labeled "storage space," but are to be kept in a new building to be erected for this purpose and located about as shown on the plan.

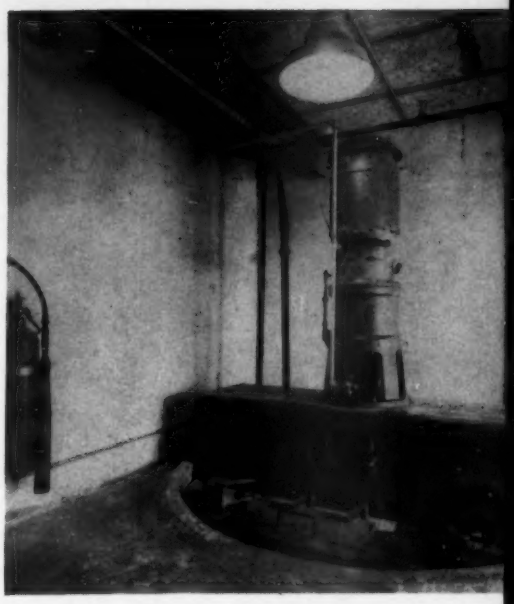
Equipment and Facilities

TWO 1400-gallon mixers are presently installed, one in each of the two two-story bays located at the north end of the main building. These two bays are separated from the adjoining enamel room by a winged and parapeted firewall. Furthermore, a winged and parapeted firewall separates the two bays.

The mixers are so placed that the charging opening is slightly above the upper floor level. This is for ease in charging. The outlets of the mixers are of such height that fill is directly into drums or other containers.

The cover of each charging opening when in the open position is attached to a release valve in the carbon dioxide flooding system. Thus, in the event of a fire the covers will close automatically.

Access to the upper floor of the two mixer bays is by means of an outside stairway; in addition, there is an emergency escape over the roof of the main building. The solid materials for the mixer batches are brought up from below by means of an automatically operated conveyor-elevator, starting from the lower floor and stopping at an upper platform just outside the upper floor of the mixing rooms.



Charging level of one of the 1400-gallon mixers.

The enamel room, where several finishing mixers are installed, is the room south of the mixer bays. This room is separated from the mixer bays and the shipping room by winged and parapeted firewalls, and the shipping room is separated from the room known as the warehouse by another such firewall.

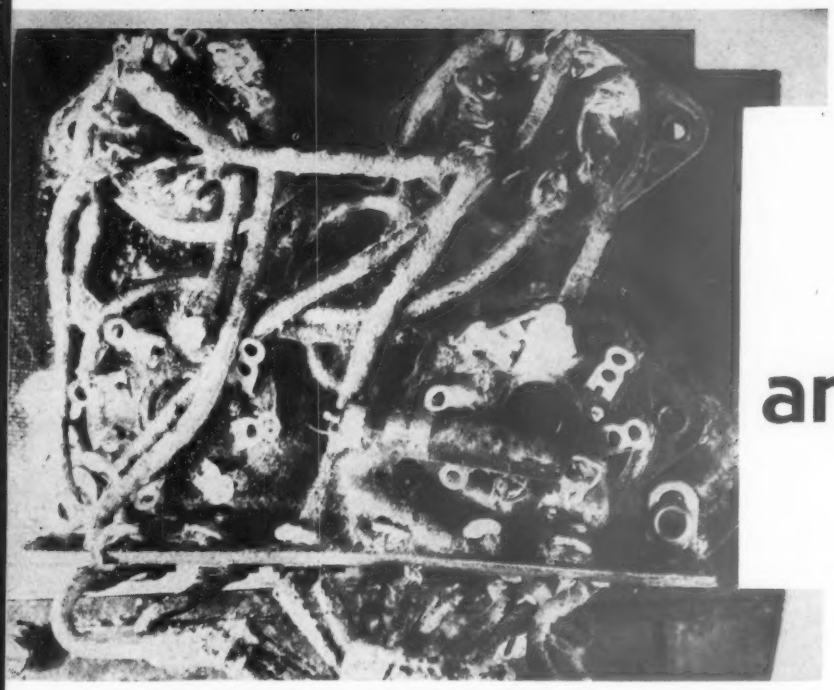
The shipping room opens onto a dock at about truck floor height; this dock is partly roofed over. The dock height is such that containers can be loaded directly onto the truck without lifting.

Safety Features

THE entire building is of fire resisting construction, and explosion venting has been provided in the walls of the dissolving rooms and the enamel room in the ratio of 1 square foot for about each 25 cu. ft. of volume. This explosion venting has

(Turn to page 27)

Interior view of the shipping room.



Useless! Fungus growth and corrosion have made this electrical equipment inoperative.

Fungicidal Varnishes and Lacquers

By
Sam Ruggeri,
Project Engineer,
Lacquer and Chemical Corp.

When World War II shifted to the South Pacific, the need for protecting electronic equipment, such as field telephone sets, "walkie-talkies," and other communications equipment, from the effects of fungi became apparent. It was difficult to foresee this need since the materials used, being primarily metals, plastics, glass, and ceramics, were thought to be resistant to the growth and effects of fungi. But, as many a "GI" found, on trying to use a piece of field equipment affected by fungi, quite a few of the materials used in the manufacture of such equipment offer a nutrient base for the growth of fungi.

Aside from the actual consumption of these nutrient materials as the fungi feed and grow on them, the equipment suffers from secondary effects due to the fungi. Many of the products formed by the fungi, being of a corrosive nature, lead to corrosion of the metals used in the equipment. Also, the sponge-like structure of the fungus growth collects and traps moisture. This accumulation of moisture close to the surfaces of the equipment in many cases provides a sufficiently conductive path to cause short circuits, resulting in non-functioning of the equipment.

Although conditions in the South Pacific brought this need for protection against fungus attack to the attention of the military and civilian users, and manufacturers of such electronic equipment, the need for this protection has been ever present. Equipment installed aboard warships operating in the North Atlantic, for instance, is subject to the problems of fungus growth when conditions approach those favorable to the growth of fungi.

These conditions vary somewhat with the species of fungus but in general include the following:

a) Suitable food for the fungus to thrive on.

Sam Ruggeri

b) A high relative humidity (usually over 90 per cent but can be as low as 70 per cent).
c) Relative high temperatures (of over 70° F.)
d) Oxygen, either from air or contained in the food.
e) Absence of light.

Except in those cases where components and equipment are hermetically sealed to exclude air, the most expedient method for coping with the fungus problem is either to use non-nutrient materials in the construction or to treat the nutrient materials so as to prevent the growth of fungi on them. Along with this latter treatment an attempt is made to increase the moisture resistance through the use of suitable vehicles as carriers for the fungicides.

Fungicide Requirements

Although there are many compounds which exhibit fungicidal properties, stringent requirements cut the number which can be used with lacquers and varnishes down to a few. A fungicide must possess the following properties to be suitable for use in a fungicidal lacquer or varnish:

a) Must show satisfactory fungus - inhibiting properties

against the fungi affecting the materials and equipment even when used in small concentrations.

b) Must not be leached by water from the dried film.

c) Must be soluble in the volatile component of the varnish or lacquer.

d) Must be stable when incorporated into the lacquer or varnish.

e) Must be stable at elevated temperatures.

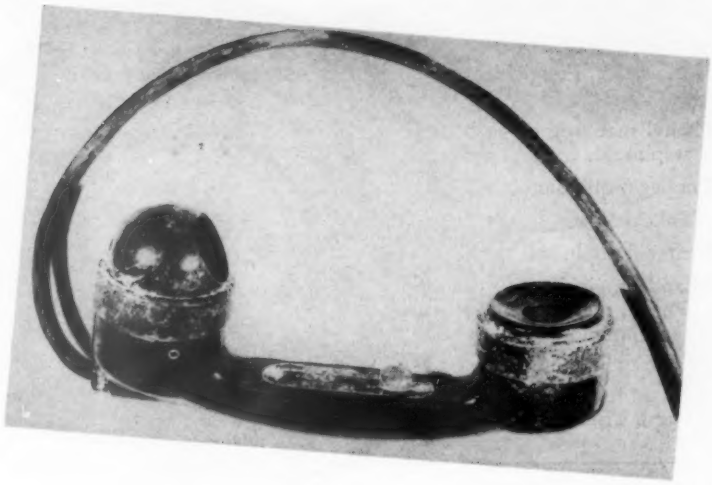
Obviously the fungicide must be able to inhibit the growth of the fungi affecting the equipment, but it must be able to do so when used in very small quantities. Any fungicide added to a lacquer or varnish will impair the qualities of the coating to a certain degree. If the amount of fungicide added is small, the effect on the coating will usually be negligible. When more than 10 per cent of a fungicide is added the coating may be impaired appreciably in numerous ways, some of which are as follows. The resultant drying time of the wet coating may be excessive. The water vapor transmission of the film may become too great. If the fungicide is a liquid it may act as a plasticizer and soften the film. An excessive amount of fungicide may result in a non-stable film and a migration of the fungicide in the dried film; the fungicide appearing as a bloom on the surface of the dried film.

The fungicide must be practically insoluble in water so that moisture will not leach the fungicide out of the film. Leaching out of the fungicide, aside from the loss of the fungicide, results in the formation of voids in the dried film. The voids will allow water to pass through the film, thus reducing the value of the film as a water barrier.

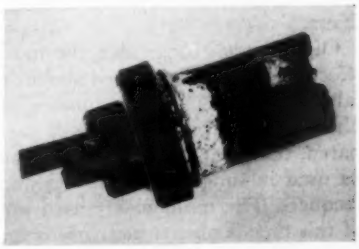
For maximum effectiveness the fungicide should be soluble in the volatile portion of the coating material so that as the coating material dries the fungicide forms a stable uniform dispersion in the dried film. In some cases fungicides which are not soluble can be incorporated by grinding the fungicide into the wet coating material. This is impractical where more than 1 or 2 per cent of the fungicide must be ground into the coating as shelf-aging usually results in settling out of the fungicide.

Assuming that the fungicide is stable in itself, it must remain stable when incorporated into the lacquer or varnish if it is to remain effective.

High temperature stability is equally important, especially in light of the trend towards smaller and more compact electronic equipment with their higher operating temperatures. The fungicide, in itself, must be stable to high temperatures. Similarly the film, with the fungicide incorporated, must be stable to high temperatures.



Marine hand telephone showing fungus growth on cable and phenolic case and corrosion on metal portions. In many cases the hand button was frozen by corrosion and made inoperative.



Cable connector shows fungus and corrosion.

Fungicides Used

The fungicides which have been found useful for fungicidal lacquers and varnishes can be classified under two general classes. These classes are: a) those which depend on metals for their action, and b) those which do not depend on metals but rather on organic radicals and non-metallic elements such as chlor-

Area of inhibition of filter paper test specimens prepared according to Ordnance Bureau Specification 52V23 (Ord.). Petri dish on the left is control; dish on right prepared with varnish containing 1% phenyl mercuric ortho benzoic sulphimide and 5% salicylanilide.

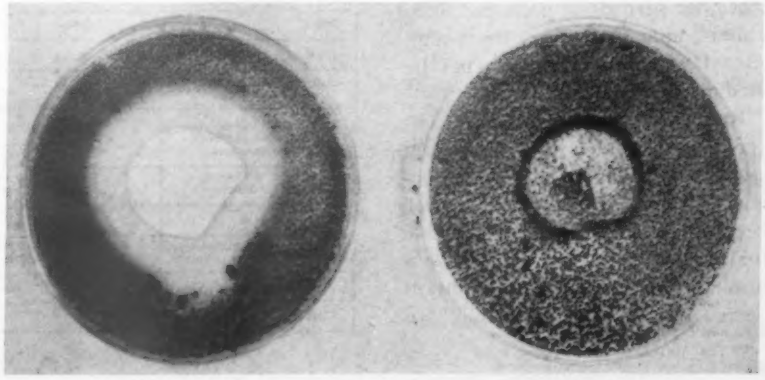


Table I

Fungicide	Percentage needed to be effective against mixture of test fungi*
Phenyl mercuric ortho benzoic sulphimide	1.5%
Copper-8-quinolinolate	2.0%
Salicylanilide	8.0%
Pentachlorophenol	15.0%
Mixed fungicides: Phenyl mercuric ortho benzoic sulphimide + Salicylanilide	1.0% +5.0%

* Test fungi mixture: Aspergillus niger, Aspergillus flavus, Penicillium luteum, Trichoderma T-1

ine for their action. As seen in Table I, the former class is the more efficient since the quantity of fungicide needed is much less than in the case of the metal-less fungicides. The major drawback in the metal fungicides is the effect they have or may have on certain electronic components, notably on unprotected selenium rectifiers.

Of the metal fungicides, the most effective ones are the phenyl mercuric salts. Although a large number of phenyl mercuric salts have been prepared, only a few of these salts can be used in fungicidal varnishes and lacquers. The most widely used salt of this type is phenyl mercuric ortho benzoic sulphimide. This salt is specified in the series of specifications issued by the Bureau of Ordnance of the United States Navy, for fungicidal varnishes and lacquers (1,2,3,4). Phenyl mercuric salts have been found to affect unprotected selenium rectifiers destroying their rectifying action. For this reason unless the selenium rectifiers in the equipment are hermetically sealed or otherwise adequately protected, varnishes and lacquers containing phenyl mercuric salts must not be used on such equipment.

Recently a copper complex, copper-8-quinolinolate, has been finding increased use in varnishes and lacquers. Copper-8-quinolinolate has been used extensively as a fungicide for textiles. Since this compound is insoluble in all common solvents it could not be used in coating materials until a suitable method could be developed for solubilizing this compound. A soluble form of this compound has been developed and it promises to find widespread use as soon as extensive field tests have established its effectiveness in varnishes and lacquers. A proposed revision of the present National Military Establishment Specification for fungicidal coating materials (5) includes a class using copper-8-quinolinolate as the fungicidal agent.* Up to the present time no detrimental effects on components by this fungicide have been noted. However the dark color of this compound may act as a detriment to a greater use of this fungicide.

Of the metal-less fungicides two compounds have been used to a great extent. These are salicylanilide and pentachlorophenol.** Both have their advantages and disadvantages and of the two, salicylanilide is preferred over pentachlorophenol. Both materials must be used in fairly large quantities, 8 per cent for salicylanilide and 15 per cent for pentachlorophenol, to be effective. Salicylanilide has a tendency to bloom out of the dried coating. Being volatile at elevated temperatures, salicylanilide will volatilize from dried films when exposed to operating temperatures above 185° F. On the other hand, pentachlorophenol is toxic and corrosive as well as being required in a rather large concentration to be effective. For this reason, salicylanilide has been specified in the Bureau of Ordnance specifications for fungicidal coating materials (1,2,3,4).

Tests have shown that combinations of fungistatic agents prove more effective than the individual fungicides. A combination of one per cent of phenyl mercuric ortho benzoic sulphimide and five per cent of salicylanilide has proven to be effective against the fungi which affect electronic equipment. In the above mentioned specifications, this fungicide combination has been specified as "Class MS" and is recommended for general use except where the presence of unprotected selenium rectifiers prevents its use. In such cases where "Class MS" cannot

(Turn to page 30)

REQUIREMENTS	52V23 (Ord)		52120 (Ord)		52V24 (Ord)	52121 (Ord)	
	Class MS	Class S	Class MS	Class S	Class M	Class MS	Class S
Fungicide: phenyl mercuric ortho benzoic sulphimide	1%	-	1%	-	1.5%	1%	-
salicylanalide	5%	8%	5%	8%	—	5%	8%
Drying time: dry-to touch	30 min.		15 min.		Cure 1 hr at 100°C	10 min	
dry hard	120 min.		60 min.			30 min	
Non volatile matter	36.3%	36.8%	20.9%	21.3%	43.4%	20.9%	21.3%
Color	13 (max.)		substantially colorless				
Viscosity	A - D		not specified		A - D	C - F	
Water vapor diffusion constant	3.5×10^{-8} gms/hr/cm/mmHg				not specified		
Dielectric strength: dry, volts per mil	750		750		1200	750	
wet, volts per mil	350		350		1100	350	
Resistance to thermal shock and bending	Four cycles of: 3 hours at 85°C; 3 hours at -40°C; and 1 to 24 hours at room temperature						
Flammability	1 inch per minute						
Adhesion and resistance to salt water	48 hours in 5% NaCl solution; 7 hours recovery						
Fluorescence	must have permanent fluorescence; no afterglow						
Flash point	25°C		not specified				

Table II

* This proposed revision has recently been abandoned.

** The use of pentachlorophenol for this application is no longer recommended.

28th ANNUAL CONVENTION

KEEN interest was observed at the 28th Annual Meeting and Paint Industries show of the Federation of Paint and Varnish Production Clubs held recently in Chicago. This can be easily attributed to existing raw material shortages and demands made by the paint industry in the interest of the national economy and defense.

The Federation's research program was one of the highlights of this year's meeting. Paul O. Blackmore, who is chairman of this committee, reported on the progress thus far made in this respect and outlined a program for future work. Twenty-four projects are currently being carried on by the technical committees of the various local clubs together with several universities and research institutions. Dr. W. O. Lundberg of the University of Minnesota briefly discussed the present status of experimental work on the various projects. He then presented a paper which dealt with the size, shape, and weight of molecules of vehicle materials in study of film formation.

Francis Scofield of the National Paint, Varnish and Lacquer Association reported on results of a study on the gain in weight of clear vehicles. The effect of humidity and temperature was also discussed.

Dr. G. C. Williams of the University of Louisville then gave results of a study on the solubility of various films in carbon tetrachloride and the ability of these films to absorb oleic acid.

L. P. Larson of the C-D-I-C Club reported on results of exterior exposure tests in order to yield practical information concerning some of the factors that are important in obtaining films with high durability for outdoor conditions.

The final report was given by George Selden of the Cleveland Club. He gave results of his studies with water and alkali tests on films prepared from various vehicles.

Another interesting phase of this year's convention meeting was the three sessions on Plant Production Problems.

The first session dealt with raw materials and featured a round table discussion on requisition, inventory, control, handling and storage.

A study of pigment dispersions highlighted the third session. The New York Club presented a paper dealing with:

(A) Paste Mixing and Roller Mill Grinding

(B) Pebble and Ball Mill Grinding

Pigment Dispersion Problems under study by the Scientific Section was discussed in a paper delivered by R. B. Shurts.

Packaging and shipping was considered in the third session which involved a round table discussion on storage, filling, labelling, casing, and handling.

Papers Delivered

The Effect of Zinc Oxide on Architectural White Alkyd Enamels—Western New York Club

The effect of varying amounts of Zinc Oxide on color retention and gloss was studied and the optimum amount of zinc oxide that can be used in formulating architectural white alkyd enamels is reported.

Accelerated Yellowing Tests on White Enamels—Baltimore Club

Conditions of temperature, humidity, and light have been established to provide an accelerated yellowing test which correlates with normal exposure.

Kinetics of Formation and Properties of Drying Oils from Diglycerol—Northwestern Club

Synthetic oils made from vegetable acids and pure diglycerol, a newly synthesized alcohol, produce faster drying, tougher paints than do ordinary oils made from glycerol. Diglycerol esters are compared with glycerol, pentaerythritol and other esters for film properties.

Water-in-oil Emulsion Varnishes and Paints—Wouter Bosch, R. W. Jepson and L. K. Bjelland, North Dakota Agricultural College

Water-in-oil emulsion varnishes and paints can be easily prepared from almost any conventional vehicle. In most cases the emulsification of a varnish does not increase the viscosity if the requirements for borderline emulsions are followed. Emulsion paints prepared have properties equal to those of straight paints.

A Theoretical and Statistical Study of Sward Rocker Hardness Determinations of Paint Films—D. J. Baker, A. J. Elleman and A. N. McKelvie, Oil and Colour Chemists' Association

Experimental and statistical data suggest certain limitations with respect to the hardness measurement of films.

Evaluation of Body Varnishes in Gloss Enamels—Golden Gate Club

The effect of addition of various amounts of different bodying varnishes to six gloss enamels is reported. Properties such as flow, gloss, reflectance and consistency were observed over a period of three months.

The Hiding Power of Synthetic Iron Oxides—Toronto Club

An improved and standardized procedure is presented for measuring the hiding and brightness of yellow and red synthetic iron oxides using the Hunter Reflectometer. Film preparation by means of a new dipping machine is described.

A Torquemeter for Measuring Power to Plant Mixes—V. W. Uhl, Lehigh University

A description is given of an inexpensive torquemeter, accurate over a 100-fold range, which was developed for the determination of power input to mixing equipment. A modified portable design is also presented.

At What Price is an Expensive Paint a Good Bargain—Georges Dechaux, Federation of Technical Associations of the Paint Industries of Continental Europe

The author examines the problems of paint consumer and offers a graphic means of arriving at the most economical balance commensurate with properties required.

Evaluation of Production Club Fineness of Gage and Paint Film Characteristics Based on Particle Size Distributions of Pigment Dispersions—C. P. Baker and J. F. Vozzella, Northeastern University

A study of the particle size distribution of TiO_2 dispersed in alkyd-resin—mineral spirits is reported with particular emphasis on rate of dispersions, the evaluation of fineness, gage readings surface irregularities, gloss and hiding power characteristics.

Evaluation of Alkyd Resins for Stoving Finishes—Birmingham Club

This paper describes preliminary determination of optimum conditions of formulations for stoving enamels and submits exhaustive series of tests for use in their evaluation.

Standard Methods for Evaluating Deep-Tone Flat Wall Paints—New York Club

Methods of tests are presented for evaluating color and sheen uniformity, mar resistance, cracking and mar removal. An inexpensive instrument for the tests has been developed and new type of test panel offering reversal advantages is employed.

Mattiello Lecture

THE second Joseph J. Mattiello Lecture was delivered by *Theodore F. Bradley* of the Shell Development Co. His topic was some New Developments in Drying Oil and Varnish Technology.

Mr. Bradley stated that although considerable progress has been made in the processing and modification of the natural drying oils to render them more suitable for the demanding requirements of the coating materials industry, the resulting products have not overcome the trend toward completely synthetic, oil-free coatings. He then reviewed some of the latest developments in drying characteristics and improved chemical and physical properties of coatings and the conclusion is reached that the drying oil industry should expand its research activities to improve its competitive situation.

Paint Industries Show

THE 1950 Paint Industries Show comprised of forty-nine exhibitors. C. J. Overmyer, Chairman of the Paint Show Committee, stated that this year's show was one of the largest ever assembled. Income derived from the show goes for educational purposes.

Many interesting products were exhibited. Among the new raw material shown were new linoresinate, octoate and naphthenate driers; a new silicone alkyd coating resin; new alkyd resin for baking and air drying finishes; epichlorohydrin resin featuring outstanding adhesion, high chemical resistance and unusual flexibility; vinyl butyral resin for formulating wash primer metal conditioners; vinyl and alkyd combinations; polystyrene emulsions; air-dry phenolic resin exhibiting unusual toughness and chemical resistance; cobalt drier; fungicide; milling aids; a six per cent calcium naphthenate; vinyl stabilizer; high iodine fractionated oil; plasticizers for nitrocellulose coatings; hot lacquer finishing technique.

In the way of new equipment, the following were of interest to the paint manufacturer: New grinding media for jar mills, etc.; labelling machine for applying spot or wrap around labels to 5 gallon steel drums; sunshine carbon arc weatherometer; new laboratory paint mills; large production mill equipped with handwheel adjustments and pneumatic discharge control; and new filling and closing machine.

New officers include *Robert D. Bonney,* President; *H. P. Ball,* President-Elect; *N. P. Beckwith,* Treasurer; and *C. Homer Flynn,* Executive Secretary.

C. J. Overmyer and *G. H. Wescott* elected members of executive committee for two years and *R. H. Everett* and *E. V. Ladd* were named for one year.

F. S. Swackhamer

Shell Chemical Appoints F. S. Swackhamer

F. S. Swackhamer, assistant manager of the Eastern Division Sales Development Department of Shell Chemical Corporation, has been appointed Manager of that department.

He succeeds W. S. Thornhill who resigned recently from Shell to organize U. S. Polymeric Chemicals, Inc., of Stamford, Connecticut, processors of plastic fabricating materials.

Swackhamer brings to his new position extensive experience acquired in the fields of plastics, resins, and organic chemicals.

•

Atlas Powder to Increase Sorbitol Production

The Atlas Powder Company plans to double its present sorbitol manufacturing facilities near Wilmington, Del., and new production of the chemical is expected to be available early next fall.

•

Glidden Purchases Extra Space

An additional 20,000 square feet of office and warehouse space has been purchased by the Glidden Company from Climax Industries, Inc., Dwight P. Joyce, Glidden president, announced recently.

Located across from the Glidden Company's Paint and Varnish Division plant in Cleveland, the new building will house additional office, shipping and warehouse facilities made necessary by an increasing volume of business in the company's Paint and Varnish Division.

•

Vegetable Oil Products Acquires Facilities of W. C. Hardesty

Purchase of the plant and facilities of W. C. Hardesty Co., Inc., at Los Angeles, was announced by C. A. Roberts, president of Vegetable Oil Products Co., Inc., Wilmington. Roberts said the Los Angeles plant will operate as the Vopcolene Division of Vegetable Oil Products Co., Inc.

By CHARLES BOGIN,
Commercial Solvents Corp.

Hot Lacquers

PART II*

The outbreak of hostilities in Korea, soon after the writing of this article, has served to reestablish the price relations of 1948 to some degree, and thus tends to nullify the cost angles of this discussion. There is considerable reason, however, for the belief that this new price situation will be of short duration, and it is certain that as a permanent condition the differentials between the prices of the butyl and ethyl solvents will be no greater than those of the spring of 1950 and possibly even smaller. The facts and ideas in this article are thus fully applicable under normal economic conditions, even if their value is temporarily reduced by the present unsettled world situation.

Lacquers, as commonly formulated, are often inferior on flow and film-smoothness to synthetics and varnishes, and require more rubbing and polishing. This is even more important than the low-solids disadvantage, previously discussed, since the rubbing and polishing operations are quite costly. Thus, some figures from one Detroit automobile plant indicate that the labor costs of the rubbing and polishing operations are probably more than five times as high as that of the cost of the spraying labor, in addition to which there are also the costly patching operations connected with the rubbing processes. Even moderate differences in film smoothness are therefore of very considerable cost importance, and an improvement along this line is even more desirable than the increase solids content. (Part I, Oct. 1950).

Many people are under the impression that the flow inferiority of lacquers is a basic characteristic of this finish and is due to technical factors. Actually, this is not at all the case, and lacquers can be formulated to produce finishes as smooth as those deposited by synthetics. This inferiority of lacquers as ordinarily formulated is due entirely to the presence of large proportions of low boiling solvents—ethyl acetate, methyl ethyl ketone etc, and this in turn is due principally to historical conditions and some old cost relations, rather than to true technical reasons. Lacquers were originally developed for the finishing of small articles, such as buttons, jewelry, etc., where flow was not an important problem, and the use of fairly large proportions of low boiling solvents was not especially objectionable. The new lacquer industry which opened up around 1925 appreciated from the very beginning that these low boilers are objectionable in the application of lacquers on the large surfaces, such as automobiles and furniture, but unfortunately the differential between the prices of the principal slow evaporating and rapid evaporating solvents—butyl and ethyl acetates—was as much as $1.50 per gallon in the early days of the new development, and the supply of butyl solvents was also quite limited. The lacquer industry was therefore forced to formulate its products with substantial proportions of the cheaper low boiling solvents, and both the lacquer manufacturers and the lacquer users developed the impression and tradition that orange peel and film roughness is a natural, practically unavoidable, characteristic of lacquer films. This impression began to fade away by 1937 as the price differential between butyl and ethyl acetates gradually came down to the insignificant figure of 10¢ per gallon, allowing the lacquer manufacturers to formulate their lacquers with much higher proportions of butyl solvents and with resulting greatly improved flow characteristics. The war years, however, temporarily re-established the conditions of 1925, both as regard to the large price differential between the butyl and the ethyl materials, as well as the scarcity of the butyl solvents. The lacquer industry was thereby forced to revert to the use of volatile formulas containing excessively high portions of low boiling solvents, and lacquers again tended to be rather poor in film-smoothness. The year of 1949, however, witnessed some very radical reductions in the prices of the slow evaporating solvents, and the price differentials between them and the low boilers are beginning to approach those of 1937. This again makes it possible for the lacquer industry to formulate lacquers of good flow characteristics without increasing costs materially, and allows the industry to correct the inferiority of lacquers in respect to film smoothness to a very large extent, if not entirely.

* *Part I appeared in the October Issue, page 8.*

Hardness

Some people may be under the impression that the presence of low boiling solvents in lacquers is essential for reasons of rapid drying and hardening. This, however, is not at all the case, and lacquers formulated without any low boilers at all will harden in the same length of time as ordinary formulas, as long as the present slow evaporating solvents —the materials boiling around 120° C—are not replaced to any appreciable extent by more slowly evaporating materials. A clear distinction must be made here between drying to a non-tacky condition and hardening to the point where the coated articles can be packed or rubbed. The length of the drying period necessary to arrive at the first point is dependent principally on the average speed of evaporation of the total volatiles in the lacquer, and the elimination of the low boiling solvents would prolong this period somewhat in many cases. The speed of drying to this point—the non-tacky condition—is, however, a matter of very little importance in the case of lacquers, since all lacquer products arrive at this condition in a very short time—in a minute or two. The important dry point in lacquer finishing is that concerned in the rubbing and packing operations, and the length of the drying period necessary to arrive at this hardness point depends essentially on the nature of the volatiles retained in the semi-dry film rather than on the nature of the average volatiles in the liquid lacquer. An increase in the proportion of the ordinary high boiling solvents already present in the lacquer, such as butyl acetate and butyl alcohol, does not prolong this drying period, since it does not materially change the nature of the solvents retained in the film. On the other hand, the replacement of some of these solvents by higher boiling materials, such as the amyls, has a pronounced effect in lengthening this hardening period, since it slows down the evaporation of the solvent retained in the semi-dry film undergoing the hardening process.

Altogether, the principle reason for the relatively poor film smoothness of so many lacquer finishes is that of the presence of high proportions of low boiling solvents in these lacquers. The truth of this can be visualized clearly if one will imagine the probable flow behavior of varnishes and synthetics if they were formulated to contain large proportions of a grade of naphtha boiling at about 80° C—the approximate boiling point of ethyl acetate, methyl ethyl ketone, etc. The varnish industry has never employed such grades of naphtha because they never offered any price advantage over the slower evaporating grades, such as V. M. & P. naphtha. This difference in the price structure is the principal reason for the differences between the practices of the varnish and of the lacquer industries in respect to the employment of extra-rapid-evaporating volatiles. The recent very large decrease in the price differential between slow-evaporating and rapid-evaporating solvents of the lacquer industry, especially those of butyl and ethyl solvents, now allows this industry to follow the more healthy practice of the older varnish industry in restricting the use of rapid evaporating materials and thereby produce finishes of much greater film smoothness.

It will be readily understood, of course, that the above ideas in favor of lacquers of superior flow characteristics, apply just as much to hot lacquers as to the standard "cold" materials, especially since the increased rate of evaporation of the solvents in the spray fan caused by the higher temperatures, and the large rise in viscosity caused by the cooling of the heated lacquer, increased the need for flow characteristics in their case. Excessive economy in the formulation of the solvent portions of hot lacquers is therefore even more likely to lead to bad orange peel, dry spray, pin-holing and all the other ills resulting from poor solvent formulation than in the case of cold lacquers, and may make the promotion of the hot lacquer idea a complete failure. In general, the lacquer industry and the individual lacquer manufacturer should be careful not to handicap themselves in their new line of products—the hot lacquers—and should use the slow evaporating solvents, such as butyl acetate and butanol, freely and generously. At the same time, the lacquer formulator should appreciate thoroughly that the replacement of the standard slow evaporating solvents above by still higher boiling materials does not improve the flow qualities of the lacquers unless they are present in very high proportions—not less than 10–15%; at the same time, the use of such high proportions is completely out of the question in normal production lacquers as it destroys the principal reason for the whole use of lacquer finishes—that of rapid air-drying and hardening. These extra-slowly-evaporating solvents also produce lacquers of substantially higher viscosities than the butyls and thereby partly destroy the advantages of the hot process itself. Altogether, therefore, the formulation of the volatile portion of hot lacquers is best based on the same slow evaporating materials commonly used in cold lacquers—butyl acetate, butanol, xylol, toluol and the naphtha substitutes for the last two, and the only real change in formulation necessary is that of the elimination of the rapid evaporating low boilers.

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National Lead Enlarges Sayreville Titanium Plant

The Sayreville titanium plant of National Lead Company will be substantially enlarged by new construction. The new buildings and equipment are scheduled for completion in fifteen months.

This further expansion of the company's facilities is intended to meet the steadily increasing demand for titanium dioxide pigments for the current industrial mobilization program. Mindful of the critical shortage which developed during World War II, National Lead Company regards further expansion a necessity to maintain the supply of this material which has vital use in protective coatings, paper, welding rods, rubber, plastics, and many other essential products.

•

James J. Sodaro Joins McDougall-Butler Staff

Mr. James J. Sodaro has joined McDougall-Butler as chief chemist. Mr. Sodaro received his B.S. Degree in Chemistry at Canisius College in Buffalo and has spent the past 10 years as an industrial chemist, the last 3 of which have been in the paint manufacturing industry.

•

W. E. Phillips Elected Director Of Pittsburgh Plate Glass Co.

W. E. Phillips of Toronto, Canada, has been elected a director of the Pittsburgh Plate Glass Company to fill a vacancy created by the recent death of James H. Heroy.

RUBBER BASE PAINTS

by H. L. Rice, Chief Chemist
Rubber & Plastics Compounds, Inc.

PART III*

It is not an easy task to bridge the wide gap between rubber latex chemistry and paint chemistry. This becomes difficult when one considers the important properties of synthetic rubber latices and attempts to make use of them in paint products.

The subject on the use of latex for water thinned paints is very new indeed. It is the purpose of this article to indicate every possible type of latex that has sufficient properties to be considered as a paint raw material. Of course, it will become evident to each individual reader which type of latex would prove to be of interest to suit his purpose. However, it will become very apparent that some latices such as GR-S I, II, III, and IV will not prove attractive. The information concerning these latices are furnished in order to accentuate the choice of latex such as 60% natural latex, or GR-S V, which are suitable materials for consideration in rubber base paint formulation.

It will be borne out in the discussion how different GR-S latices compare with natural rubber latices. It is also of prime importance to include the various specifications as listed by the Office of Rubber Reserve, R F C, for the different latices, as well as the several test methods formulated by that agency. Proper method of dispersion and formulation of colors into rubber latices will also be discussed. Because of this and other factors, the information as indicated by the Office of Rubber Reserve becomes very useful and appropriate.

Vulcanized Latex

Latex which is free of any vulcanizing ingredients, yields fairly tough films, which are fairly good or satisfactory. On the other hand, unvulcanized films also are known to yield the following undesirable properties:

1. Latex films with no vulcanizing ingredients increase in modulus when cold, and soften when not.
2. They deteriorate very rapidly when exposed to temperature changes and light, becoming either hard and brittle or soft and sticky.
3. Their other physical properties are poor in regards to weathering.

With vulcanization it is possible to correct these undesirable properties and to impart maximum strength and lasting quality to the latex film. Vulcanization of the rubber latex paint film is obtained by adding to the latex itself the proper vulcanizing ingredients in the form of a single composite pebble milled dispersion; a definite amount per each container of finished latex paint, tied in a smaller crock to the neck of the larger container.

Accelerators

Setsit-5 eliminates the necessity of dispersing an accelerator before adding it to the latex mix. Originally it was developed for use with GR-S-Latex type No. 3 to promote low temperature curing, which is most suitable for use in water thinned latex based paints.

As an accelerator for curing compounds, Setsit No. 5 will produce high tensile strength to pure gum latex compounds, especially after aging. With natural latex and GR-S latices, as well as reclaim dispersions, it can be used in the amounts of 4–6% based on dry rubber hydrocarbon to yield room temperature cures.

Setsit No. 5 offers two distinct advantages. They are ease of incorporation and storage stability. For latex based paints this is very important. A mixture consisting of one part of water and two parts of Setsit-5 may be stirred directly into the latex. It is best to add the Setsit-5 after the stabilizer has been added to the latex, and before any fillers. This resulting mixture will not thicken or settle out after prolonged periods of storage. It is necessary for GR-S latex formulations containing casein and Setsit-5 to have additional ingredients to maintain high viscosity. Both GR-S Type III and V are low in viscosity. Recourse to the use of fillers such as dispersed clay is helpful.

With natural latex (60%), the amount of Setsit-5 to be employed is 1.5%. For GR-S latices the amount should be no less than 3%. These percentages are based on the amount dry rubber.

For GR-S latices, which require the addition of thickeners to increase viscosity the employment of 5% methyl cellulose solution is most advantageous.

The 5% methyl cellulose solution is made up as follows:

	By Weight
Methyl cellulose (25 C.P.S. viscosity)	5 parts
Water	95 parts

* *Part I appeared in the March Issue, page 8.*
Part II appeared in the April Issue, page 8.

Stir the methyl cellulose into hot water, until well dispersed. It will then dissolve when cooled to room temperature or below. Refrigeration can be used to accelerate the dispersion of the solution.

Compounding

Vulcanization — Butadiene-styrene copolymers are noticeably slower in rate of vulcanization than natural rubber, thus more acceleration is required to produce a comparable cure for a given time and temperature. Since many latex applications call for vulcanization at temperatures of 100° C. the data presented are confined to this temperature. It is of course, obvious that if higher temperatures are permissible, the amount of acceleration can and should be reduced. The most satisfactory accelerators for general latex work are the dithiocarbamates (such as Methazate, Ethazate, Butazate, etc.), or the thiurams (Monex), or combinations of these with thiazoles (e.g. Butazate with M-B-T or OXAF). For evaluation purposes, a composite paste comprising the following may be used:

Sulphur	2.0
Zinc Oxide	3.0
OXAF	1.5
Butazate	0.5

This combination produces good cures in gum stocks and most loaded stocks in 30–60 minutes at 100° C in circulating air. The OXAF may be omitted from the formula if the Butazate or its equivalent is raised to about 1%.

For most purposes the use of two parts of sulphur is suggested to produce well-cured vulcanizates. In combination with natural rubber latex, it appears that even higher sulphur ratios and more acceleration are desirable in order to equalize the rates of vulcanization of the natural and synthetic rubber.

Dithiocarbamate accelerators cause synthetic latices to precure in the latex state just as they do when present in natural latex. This precure should not be allowed to proceed too far as it will result in reduced tensile strength and elongation. Where possible it is desirable to mix only enough compound with accelerator for use over a relatively short period of time, or if larger quantities must be handled to adopt some cycle by which freshly prepared compound is added at regular intervals.

The amount of zinc oxide used does not appear to be critical. Where transparency is desirable, the amount may be limited to under 1% while for general purposes 2–3% may be used.

The same methods of vulcanization used for natural latex may be used with synthetic latices, that is, vulcanization may be carried out in air, water, steam, ammonia, etc. provided a proper balance of curing ingredients is worked out.

Additives

Stabilizers and Wetting Agents. The commonly used stabilizers and wetting agents such as casein, glue, sulphated alcohols, sulphonated products, etc, may be used with GR-S latices to impart stability against mechanical working as in spraying or against chemical destabilizers, and to improve the wetting qualities of the latices.

Where wetting agents are to be added, it will be found usually that more will be required than natural latex to accomplish the desired results. This follows from the greater surface and hence adsorptive capacity of the very small GR-S latex particles.

Fillers. The behavior of fillers in GR-S latices is very interesting. It is a well known fact that fillers in natural rubber latex are merely diluents and reduce tensile strength and elongation in proportion to the amount added. In GR-S latices this is not always the case. Certain fillers in GR-S latex behave like fillers in the dry polymer and show a certain amount of reinforcement. Fillers like whiting, zince oxide and titanium dioxide decrease the tensile strength. On the other hand, carbon black gives a very marked increase, while clay produces a small improvement with 75/25 butadiene-styrene polymer; the improvement from using carbon black is not so pronounced with the 50/50 polymer, but considerable loading is possible without sacrifice of tensile strength or other properties (except set).

Handling and Processing

There are certain properties of GR-S type latices which should be discussed as they govern subsequent processing of the latex compound.

Drying. Synthetic rubber latices dry more slowly than natural latex. In addition they are more sensitive to drying conditions. Best results were obtained when the lowest practical drying temperatures were used, (e.g. 50° C or lower).

If zinc mercaptobenzothiazole is to be omitted, it is desirable to increase the amount of dithiocarbamate to about 1.0 part. If the dithiocarbamate is not used, vulcanization should be carried out at higher temperatures, such as 120° C. These vulcanizing ingredients may be used as a composite dispersion by ball milling the accelerator, sulfur and zinc oxide with 0.5 parts dispersing agent, such as Daxad 11, Vultramine, etc. to give a 45 to 50% dispersion.

It is recommended that freshly prepared pastes be used since experience has shown that erratic results may occur when old pastes are used, particularly those containing zinc oxide. Additional stabilizers, such as soap, may be used with this compound if required in some cases. Films should be prepared promptly after the compound is made as prevulcanization may occur in the final films and produce erratic results.

Preparation of Films. Dispersions of the vulcanizing ingredients or mixture should be stirred into the latex carefully to avoid incorporation air. Air in the compound may show up in the film as bubbles. It is therefore, advisable to let the compound stand for some time (1 to 2 hours) after mixing to allow the air to escape. It is frequently common practice to subject the compound to a mild vacuum (20″ to 25″) to hasten the removal of air, prior to depositing the films.

Since most latices are evaluated at relatively low solids, cracking of films frequently occurs on drying, due to marked shrinkage. To avoid this, it is desirable to increase the viscosity of the mix considerably, as by adding such thickeners as ammonium alginate in amounts from 0.25 to 0.5 parts per 100 parts polymer, alkaline casein solutions etc. The optimum amount depends on the choice of thickener and the solids of the latex being used. The viscosity usually desired is approximately 75 to 100 cps.

Films are spread on smooth clean glass, held in the horizontal plane and about 10 × 12 inches in size by means of a spreader bar. This lat-

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ter device is simply a straight bar of metal which has been cut along one edge to give a uniform depression of about .04 to .05 inches in depth. When latex is spread with such a bar, the wet film thickness is about .02 inches, providing the compound is at 40.0% solids concentration.

Films are usually dried in air overnight at room temperature, although accelerated drying at elevated temperature may be used. The maximum temperature to avoid precure should not exceed 50° C. After drying, the upper surface is dusted with a fine powder, such as soapstone, mica, whiting, etc., and the film is stripped from the plate following which the reverse side of the film is similarly dusted. The film is then divided into four pieces of equal size for testing.

Vulcanization. Vulcanization is conveniently carried out by suspending films in an air oven with efficient circulation of the air. The formula given above will give optimum cures in 30 to 60 min. at 100° C. A range of cures is usually run, such as 15-30-60-120 min. at 100° C. to include both an undercure and an overcure in the series.

Film Testing. Tensile, modulus or stress at 300% or other elongation and elongation at break are determined with a Scott machine provided with a special head (such as Model No. L-3 SP), recording forces up to 10 pounds and separating at a rate of 20"/minute. Permanent tension set at the break point is measured by determining the increase in length of the broken specimen (between bench marks) one minute after break.

The test piece is cut from the stock with a standard ⅛" × ½" dumb-bell die. Usually two to six tests are made for each cure. The A.S.T.M. Standard Section, 1942 Edition, part III, D-412-41, describes, formulae and calculations for such rubber film testing.

In comparing different latices, it is often desirable to average all the results for the range of cures and to consider these averaged values as characteristic of the latex rather than to give only the data for the optimum cure.

(Turn to page 24)

Table I

	Specifications	**Average Production Data		
		Av.	Min.	Max.
Total Solids	58.0% min.	59.4	58.1	60.3
Residual Styrene	1.50% max.*	1.17	0.52	1.54
Total Soap Content	1.50% min.* 2.00% max.	1.80	1.57	2.00
pH	9.50 to 11.00	10.34	9.6	11.0
Turbidity	2.0 min.	2.27	2.13	2.85
Viscosity at 55% Solids	350 cp. max.	149.0	125.0	192.0
Mooney Viscosity of latex film (MS/212° F at 1½ min.)	65 to 95	74.5	65.0	86.5

* On the total latex

** Average specification test data for four months production, Nov. Dec. 1946 and January, February, 1947 (Goodyear-Akron)

Table II

	GR-S Latex Type V	Another High Solids GR-S Latex*	GR-S Latex Type II
Total Solids	58 to 61%	55.8%	26 to 28%
Rubber Solids	56 to 59%	53	24 to 26%
Soap Present (% on solids)	2.5 to 3.4%	3.7%	7%
Soap Requirement to saturate particles (grams potassium oleate per 100 grams solids)	2.0 to 3.0	4.8	6 to 8
Surface Average Particle Diameter—Ang	2500–3500	2170	700–900
Viscosity-cp. (at 55% solids)	100–400	880	Paste at 45% if concentrated

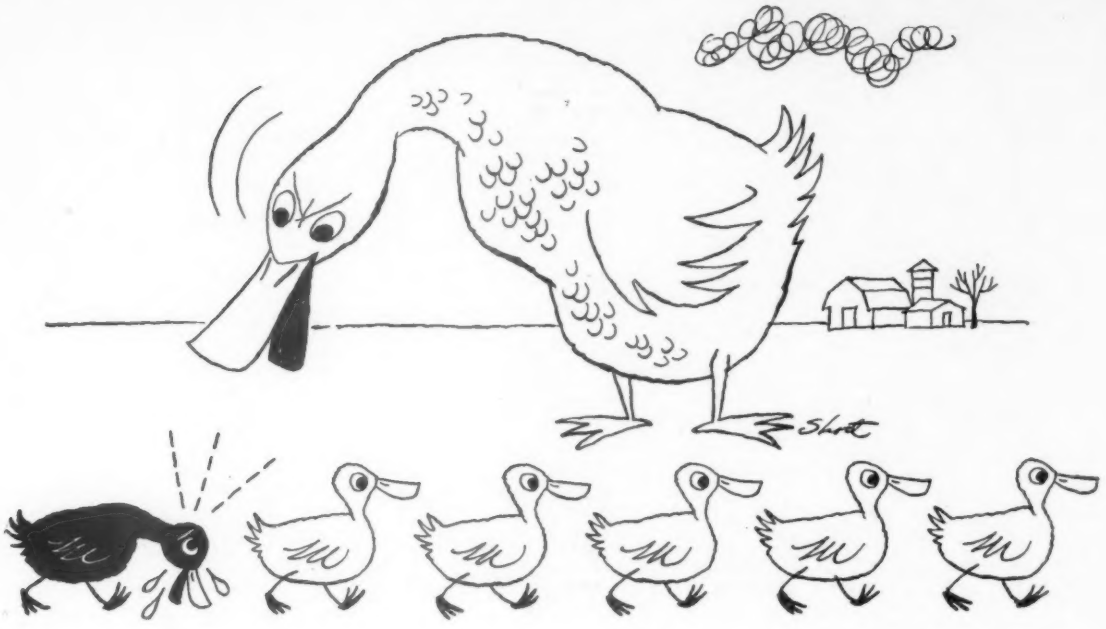
* Containing Daxad (Production run).

Table III

Time in Minutes	Vulcanized Natural Rubber Latex	GR-S Latex Type V	GR-S Latex Type III Creamed to 50% Solids
0	100	100	100
10	35.7	29.9	56.1
20	6.9	7.8	38.9
30	4.4	4.1	29.3
40	..	2.6	22.1
50	..	1.99	17.1
60	1.8	1.37	13.4
70	..	1.06	10.6

Table IV

	A	B
Type V Latex solids	100	100
Zinc Oxide	none	5.0
Sulfur	none	2.0
Setsit-5	none	3.0
Di-betanaphthyl-p-phenylene-diamine	none	1.0
	100	111.0
Tensile, psi		
5′ cure at 220° F	170	220
15′ " " "	200	245
30′ " " "	210	350
60′ " " "	270	395
Elongation, %		
5′ cure at 220° F	470	360
15′ " " "	510	280
30′ " " "	520	280
60′ " " "	525	270
300% Modulus, psi		
5′ cure at 220° F	160	210
15′ " " "	140	...
30′ " " "	145	...
60′ " " "	150	...



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THE Fairmont Hotel in San Francisco was the scene of the 62nd annual convention of the National Paint, Varnish and Lacquer Association, held Nov. 15-17th. A record attendance of over 2,000 received first hand information from representatives of Business, Military, and Government on the present program of armed peace and how this program will affect our national economy.

Of particular interest to all paint manufacturers was the raw material symposium which attracted a capacity crowd. Short talks were made by representatives of the raw material products covering current conditions and future prospects. A question and answer period followed each group of talks which were divided into drying oils, solvents, thinners and driers, resins, and containers.

Another highlight of this convention was the Western Regional Meeting of the Federation of Paint and Varnish Production Clubs, held Nov. 17 and 18th. Eight interesting papers involving the technical aspects and phases of the paint industry were presented. In addition, a forum on small orders was held and this was received enthusiastically by members attending the meeting.

Addresses

J. F. Battley

General Joseph F. Battley, President of the National Paint, Varnish and Lacquer Association in an address before the convention, compared world conditions of 1939 with today. The same concessions to satisfy the aggressive demands of dictators who rose to power upon principles of greed and inhumanity, had been of no avail. Our government had reached the inescapable conclusion that the basis of a common ground of settlement of international problems by continuing appeasement, and thereby the maintenance of peace, had been brushed aside. The only alternative open to America was to arm ourselves and our friendly allies to defend our freedom and our people.

Now another form of dictatorship has arisen and again aggression and demands become the order of the day. "We are embarked upon a program for an armed peace," said General Battley,—"resolved to be strong enough to put down unlawful aggression and to find, if possible, honorable means of maintaining peace and preserving our cherished rights and privileges."

General Battley stated that the military program must continue and the needs for controls should increase. In commenting on the unprecedented sales of the paint industry this year, which exceed the record year of 1948, he called attention to the early predictions of a recession, over-production and unemployment. He credited American businessmen with the present high sales and production figures.

The paint industry, through its rapid expansion, now finds the raw material market in the unusual position of not being able to supply all of its needs.

He stated that the Government plans to have both Military and Civilian needs go forth with the least possible effect upon each other. Therefore he predicted good business during the entire period of the emergency.

In closing he said, "We are fighting for peace and it will come, when all Nations of the World come to a common understanding, we will return to our ordinary pursuits. Until then we will face a strange interlude of war without mobilization that is partly keyed to consumer needs. History has never before recorded such a condition—and I hope and pray that our Nation will never again see anything similar or worse."

"Ahead of us now is the Star of Peace, and the determination of the American people and American industry to see a job through, always wins. This is our job —yours and mine—to sell American ideals as we never have before, so that we may protect our children, our homes and our business in the years to come."

Leo Cherne

America faces a test it has never before experienced. The degree of rearmament to which we have committed ourselves for the strengthening of our military apparatus makes it impossible that we shall enjoy a peacetime economy as long as armament remains the only hope for peace in the world. In addition to strengthening our own sinews, the degree of our participation in revitalizing the defenses of Western Europe will add further to our burden and make more remote the operations of an unhampered enterprise economy.

The real size of this problem can be understood only if we realize that we may live in perhaps a full generation of half-war. We are, in fact, planning for two eventualities, neither pleasant. The first is the possibility that sometime within the next five years we may run head-on into the aggressive imperialism of the Soviet Union. Consequently, all our industrial and military planning must contemplate the possibility of direct conflict with the U.S.S.R. The second prospect, while still tragic, is the more hopeful. We build our military strength and those of our democratic allies in the hope that the strength itself will discourage the aggression of the Soviets and that the head-on collision may be avoided.

There are several inescapable problems that necessarily flow from this fact. The entire economic emphasis of the period ahead must continuously be upon expansion and improvement.

The very process of expansion consumes enormous quantities of scarce materials. And it is here that there may be major resistance. It may prove as urgent to expand basic industry to meet tomorrow's needs as to meet the military needs today. And in a large sense, the need for steel for one purpose can hardly take priority over the other. Both must proceed at the sacrifice of some currently essential aspects of civilian life.

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The answers must be found not only in the hours worked, and in the degree of output within those hours. We must actively explore the means of employing all available unused manpower both within this country and in our more immediate neighboring countries.

If we are successful in each of these efforts, if indeed we expand as rapidly as reason indicates we should, it is not inconceivable that long before the emergency will end some of the industrial repression we face in the months ahead may be lifted. One of the basic purposes of expansion, as a matter of fact, is to enable us to more effectively meet the continuing needs of a civilian society while fully filling the requirements for armament. We tighten our belts for a while, in other words, in order to be able to loosen them with greater safety.

National Security Day was the main topic of the morning session of Friday, November 17th. Interesting and informative talks on Government Services, Manpower and National Production were presented. These were:

The Role of Government Services Administration in Government Supply by *Willis S. MacLeod,* Director, Standards Div., General Services Administration.

Manpower Problem in Relation to Present Defense Activities by *Arthur Motley,* Assistant Director, U. S. Employment Service, U. S. Dept. of Labor.

Objectives and Operation of National Production Authority by *Charles C. Concannon,* Assistant Director, Chemicals Div., National Production Authority.

Federation Meeting Papers

Lead Pigments and Paints—A. Stewart, National Lead Co.

The effects of lead compounds formed in paint films attendant to incorporation of lead pigments in the formulation on durability, water permeability, oxidation, gloss retention, physical structure and mechanical strength of the films will be discussed and illustrated with slides.

Properties of Petroleum Solvents as Related to the Viscosity of Alkyd Resin Solutions—C. M. Shaw, California Research Corp.

Three general types of hydrocarbons occurring in petroleum solvents are to be discussed with special references to the effect of each type on the viscosity of a long oil alkyd resin. The equilibrium between colloidal association and solubility will be considered. The Kauri-Butanol value as a measure of solvency will be re-appraised.

Silicone Application for Finishes—J. W. Raynolds, General Electric Co.

The impact of the silicone resins on the surface coating industry will be discussed with particular reference to uses of the silicones as film formers, compatibility with other film formers, special techniques required in applying finishes over surfaces pre-treated with silicones (e. g. refinishing automobiles over silicone polishes), methods of combatting pitting of films in which silicone has been used for anti-foaming or anti-flooding properties.

Effect of Polyol Variation in Tall Oil Ester Coatings—R. W. Tess and C. A. May, Shell Development Corp.

Commercial tall oils were esterified using glycerol, pentaerythritol, polyallyl alcohol and Epon resin. Maleic modifications were also studied as was the effect of varying percentages of rosin acids in the tall oil. Comparisons of these variations will be discussed.

The Finishing of Douglas Fir Plywood—T. H. Moran, Douglas Fir Plywood Institute

Current finishing problems, test fence data, field observations on finishing systems, test methods for measuring the value of both interior and exterior coatings for the versatile Douglas Fir Plywood will be discussed.

Practical Methods of the Application of Blacklight—M. J. Vogel, Vogel Luminescence Corp.

A description of the terms Luminescence, Fluorescence, Phosphorescence and Daylight Fluorescence. Sources and effectiveness of long and short ultra violet light will be demonstrated. Various phases of Fluorescent and Phosphorescent Paints will be discussed. Blacklight as a laboratory tool will be demonstrated.

Research in the Paint and Varnish Industry—Present and Future by W. E. Rand, Stanford Research Institute

Estimates of the annual expenditures of the industry for routine control, immediate product development and basic research are given. A description of the workings of the typical non-profit research institute is given together with a critique of the paint industry's research effort with suggestions for future improvement.

The round table forum concerned with Small Order Manufacture was held on Nov. 18th. Small orders have always offered a problem to the paint manufacturer in that they are a serious drain on profit. In connection with this problem short talks on such factors as formulation, production, product control, cost accounting, and management decision were presented.

Carleton Ellis, Jr.

Plaskon Establishes New Coating Resin Department

The establishment of a new Coating Resins Department under the direction of Carleton Ellis, Jr. as manager has been announced by W. W. Knight, Jr., general manager of the Plaskon Division, Libbey-Owens-Ford Glass Company. The new department will include all operations connected with the development, manufacture and sale of Plaskon coating resin products.

Mr. Knight stated that this centralization of responsibility for all activities relating to the coating resin products should assure more efficient operation in servicing customers of this type of Plaskon products. Plaskon coating resins are widely used in the manufacture of paints, lacquers, varnishes and other finishing materials.

•

Baker Castor Oil Company Appointments Announced

Mr. I. M. Colbeth, president, Baker Castor Oil Company announces appointment of Mr. Donald S. Bolley as director of research, Mr. M. Kent Smith as director of development, and Mr. Russell Hayes as chief of the engineering department. Increased emphasis on technical activities and expansion of the research staff has necessitated the division of responsibility within the technical division.

•

Manufacturing Chemists' Ass'n. Opens New York Office

The Manufacturing Chemists' Association, Inc. has opened an office at 330 West 42 Street, New York, under the direction of Robert L. Taylor, executive vice-president. This is in addition to the Association's present offices in the Woodward Building, Washington, D. C.

Activities of the new office will be devoted initially to public relations matters and the servicing of member needs and Association affairs in the New York area.

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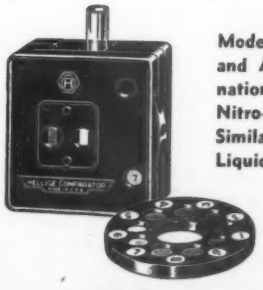

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RUBBER BASE PAINTS

(From page 16)

Colors

Colors for use in latex type paints must be easily dispersible in water to give fine particle size dispersions. They also must be completely compatible with the type of latex with which they are to be blended in, since they must be immune from the effects of alkalies and dispersions usually present in natural and synthetic latices.

Some additional requirements of latex colors are low cost based on tinctorial strength, brilliance and permanence of color, non-migration, non-bleeding, or cracking, on cure or aging of the latex film.

The most satisfactory way to produce a good color suspension is to grind the color in a pebble or ball mill with dispersing agents, protective colloids and water. Colors may be ground alone or in conjunction with other insoluble materials to be used in a latex compound.

A convenient color paste recipe for latex paints is as follows:

	Parts by weight
25% color paste	100.0
10% Darvan 1	30.0
10% Ammonium Caseinate Sol	30.0
Water (soft)	240.0

The ingredients are slurred together and ground in a ball or pebble mill for 48 hrs. If inefficient grinding is obtained in a pebble mill, reduced tinctorial strength will result. Therefore for best operation the pebble mill jar should be filled ½ to ⅝ full of pebbles or stones of various sizes and sufficient slurry added to just cover the stones. Operating speeds as recommended by pebble mill manufacturer should be used. This is around 70 rpm for a gallon jar, slower for the larger sizes, and faster for smaller sizes.

Types

We are now about to discuss the various types of GR-S Latices. Sampling and testing are in accordance with Section B-3 of the Office of Rubber Reserve. Total Solids, Residual Styrene, pH, and Surface Tension measurements are according to Test Methods E-1, E-2, E-4, and E-5 respectively covered in Section B-3.

GR-S Latex II is the same as Type I except that no antioxidant has been added.

Specification Limits

Chemical		
Total Solids	26.0 %	min.
	28.0 %	max.
Residual Styrene	0.50%	max.
Physical		
pH	8.50	min.
	9.25	max.

GR-S Latex Type III is made by charging approximately equal parts by weight of butadiene and styrene in the polymerization formula. Type III does not contain an antioxidant or shortstop.

Specification Limits

Chemical		
Total Solids	37.0 %	min.
	39.0 %	max.
Residual Styrene	0.50%	max.
Physical		
pH	10.00	min.
	11.00	max.
Surface Tension	45.0	dynes/cm

GR-S Latex Type IV is the same as Type III except that it is produced in a more concentrated form.

Specification Limits

Chemical

INTRODUCING

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Trade-Mark

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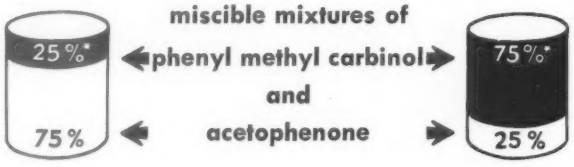

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alkyd resins	odor-masking agents

For information, write or call the nearest CARBIDE office, requesting data sheets F-7370 and F-6970.

*Approximate compositions.

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Total Solids	39.1 % min.
	45.0 % max.
Residual Styrene	0.50% max.
Physical	
pH	10.00 min.
	11.00 max.
Surface Tension	45.0 dynes/ cm. min.

GR-S Latex Type V is a high solids latex of a butadiene-styrene copolymer. The latex is manufactured to a high solids content in the polymerization reaction without concentration by evaporation, creaming, or other means. Low concentrations of emulsifiers are used in the preparation. No viscosity reducing agents are used in making GR-S Latex, Type V, since the presence of such materials may be undesirable in some latex applications. The latex contains no antioxidant or short-stopping agent.

GR-S Latex, Type V is manufactured and distributed by Reconstruction Finance Corporation, Office of Rubber Reserve.

The outstanding properties of GR-S Latex Type V are: a) High total solids content; b) High rubber solids content; c) Relatively large particle size; d) Low soap content; e) Low viscosity; f) Rapid drying rate.

Latex Characteristics — Rubber Reserves specifications and average production data are shown in Table I.

Comparative properties of GR-S Latex Type V are shown in Table II along with another high solids type GR-S latex of a similar butadiene-styrene content.

The data in Table III shows the drying rate of Type V latex to be considerably faster than that of Type III Latex which has been creamed to 50% solids. Type V latex dries at approximately the same rate as vulcanized natural rubber latex. Drying rates were studied in flat circular tins of 2¼ inch diameter, using 4.5 gram latex samples at 50% solids.

Properties of Polymer. The hydrocarbon charge ration of GR-S Latex Type V, is approximately the same as that of regular GR-S. For that reason, the polymer from this latex exhibits good low temperature flexibility, but it has the low tensile and low tear strength properties in gum stocks which are characteristic of GR-S. The data in Table IV describe the tensile and elongation of evaporated film gum stocks from Type V latex with and without curing agents.

•

McSweeney Assumes New Duties at Battelle

Dr. E. E. McSweeney has assumed new responsibilities as Battelle Institute representative to the chemical industry. According to Battelle Director Clyde Williams, Dr. McSweeney in his new assignment will direct relations between Battelle and sponsors in the industry. He will also assist prospective sponsors of research in setting up their research programs.

A member of the Battelle staff since 1938, Dr. McSweeney in recent years has directed plastics, rubber, and coatings research. He is chairman of the Division of Paint, Varnish and Plastic Chemistry of the American Chemical Society and serves on other ACS committees. He was formerly president of the Cincinnati-Dayton-Indianapolis-Columbus Paint and Varnish Production Club and has been active in the technical programs of the American Society for Testing Materials and the Society of Plastics Engineers.

•

Moisture Register Company Elected Member of ASTM

Announcement has been made of the election of Moisture Register Company of Alhambra, California, manufacturer of electronic instruments for testing moisture content, to membership in the American Society for Testing Materials.

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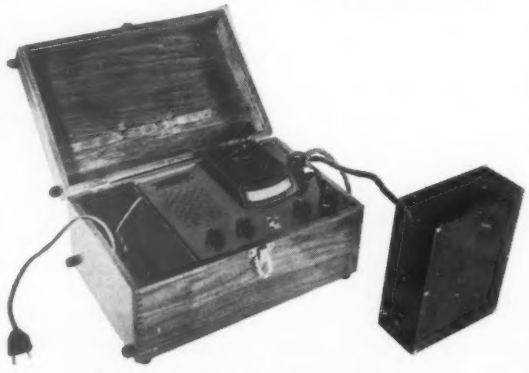

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PYROLAC'S NEW PLANT

(From page 7)

been done by using light-weight glass, diamond scored on the exterior. In the event of a vapor-air explosion in these locations, this relief should prevent serious structural damage.

A nonsparking and conductive floor finish has been used throughout the manufacturing section on both levels and in shipping room so as to minimize the hazard of static accumulating on persons or on containers being moved across the floor. In the manufacturing section the floors are pitched ⅛″ to the foot toward the drain openings.

All electrical equipment throughout the manufacturing areas of the building is explosion-proof, Class I, Group D. Some nonexplosion-proof controls have been installed in the boiler room located near the south end of the building, since this room is at a very safe distance from any solvent process work.

A radiant heating system has been installed, and has proven to be very satisfactory. Furthermore, it has eliminated radiators and piping on which dust and heat-sensitive materials could collect and be a possible source of fire. The radiant heating system consists of pipe buried in the floor with warm water being circulated through the pipes.

All rooms in the manufacturing building are protected wtih sprinklers spaced in the manufacturing and storage areas at about 50 to 60 sq. ft. per head. Sprinklers have not yet been installed in the nitrocellulose storage, although this is to be done in the very near future.

Each of the 1400-gallon mixers is protected by an automatic carbon dioxide flooding system. In addition to such protection, hand carbon dioxide extinguishers of adequate size are installed at several locations about the plant.

The accompanying photographs illustrate both building exteriors and interiors, and show some of the equipment installed. These pictures, the layout plan, and this description afford some idea of the kind of plant we have built. We think we have provided a number of worthwhile safeguards which should assure our employes, our customers, and the Public that we will not have a serious interruption of the business on account of fire.

•

Chicagoland Paint Industries Awards Fellowship to Bauman

The Chicagoland Paint Industries 1950 fellowship in chemical engineering has been awarded to Howard F. Bauman of Chicago.

The fellowship, offered by the Chicago Paint, Varnish and Lacquer Association and the Chicago Paint and Varnish Production Club, provides an award of $1,000 and tuition for two semesters leading to a master of science degree in chemical engineering. Bauman, a 1948 chemical engineering graduate of Purdue University, will conduct a research project selected by the paint groups and the Institute.

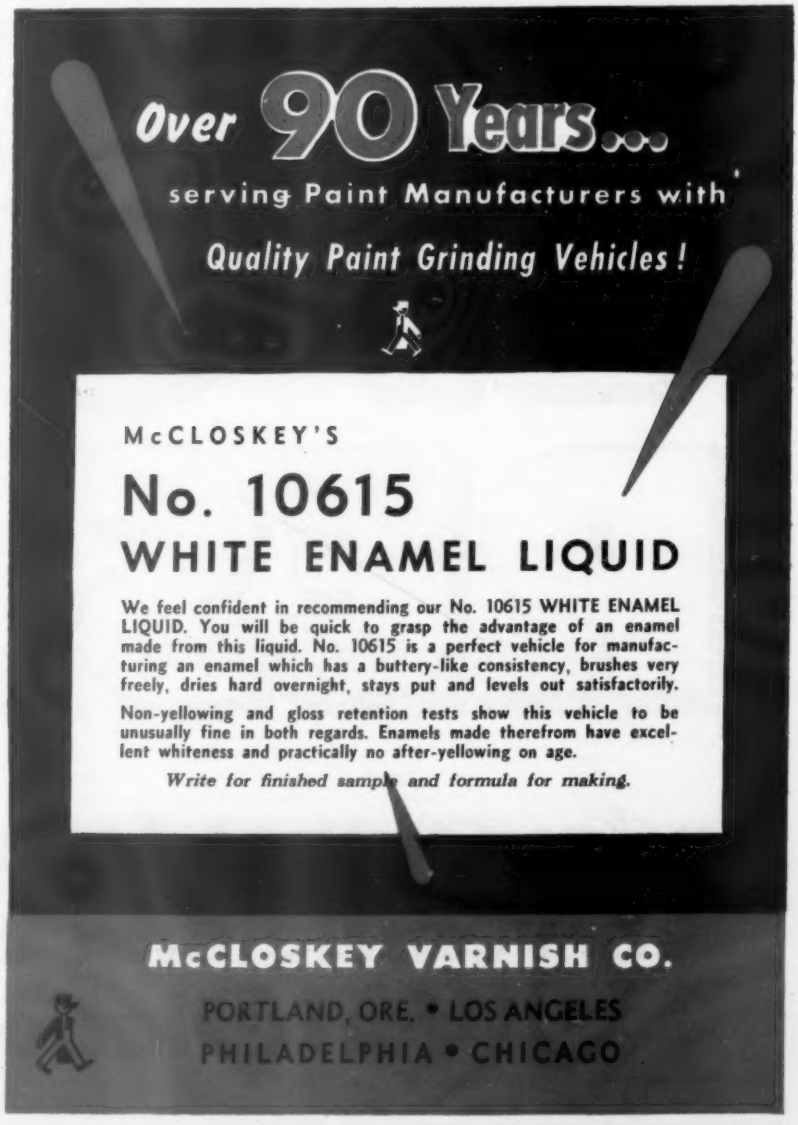
Rinshed-Mason Acquires Plant at Anaheim

The Rinshed-Mason Co. of Detroit has purchased the former Caltone plant located at Anaheim, Calif. The plant is in the process of being converted to the manufacture of automotive and industrial finishes. Headquarters will continue at Detroit.

•

Reichhold Chemicals Producing Resins in Japan

Reichhold Chemicals Inc., has announced the formation of a Japanese affiliate, Reichhold Chemicals, Inc. (Japan). This firm is producing a line of RCI resins for Japan's paint, printing ink, plastics and textile industries. The plant in located at Amagasaki near Osaka.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FUNGICIDAL VARNISHES

(From page 10)

be used, "Class S" which consists of eight per cent of salicylanilide is specified. Since the salicylanilide volatilizes at elevated temperatures, it cannot be used where temperatures of over 185° F are encountered. Where a combination of high temperatures together with the presence of unprotected selenium rectifiers prevents both "Class MS" and "Class S" from being used, no fungicidal coating can be recommended at the present time. It is anticipated that copper-8-quinolinolate will find a wide use in such applications.

Vehicles

At the present time two fungicidal varnishes and two fungicidal lacquers have been specified in the Bureau of Ordnance Specifications. A summary of these four materials follows. See Table II for detailed requirements.

Bureau of Ordnance Specification 52V23(Ord): Varnish, Moisture- and Fungus-Resistant (Air Drying).

This specification covers a short oil para-phenyl phenol tung oil varnish suitable for spray, dip and brush application to electrical and electronic equipment, components, and assemblies to render them more resistant to moisture and fungus growth. Its greatest use is as a final overall spray application to assembled units.

Bureau of Ordnance Specification 52L20(Ord): Lacquer, Moisture- and Fungus-Resistant.

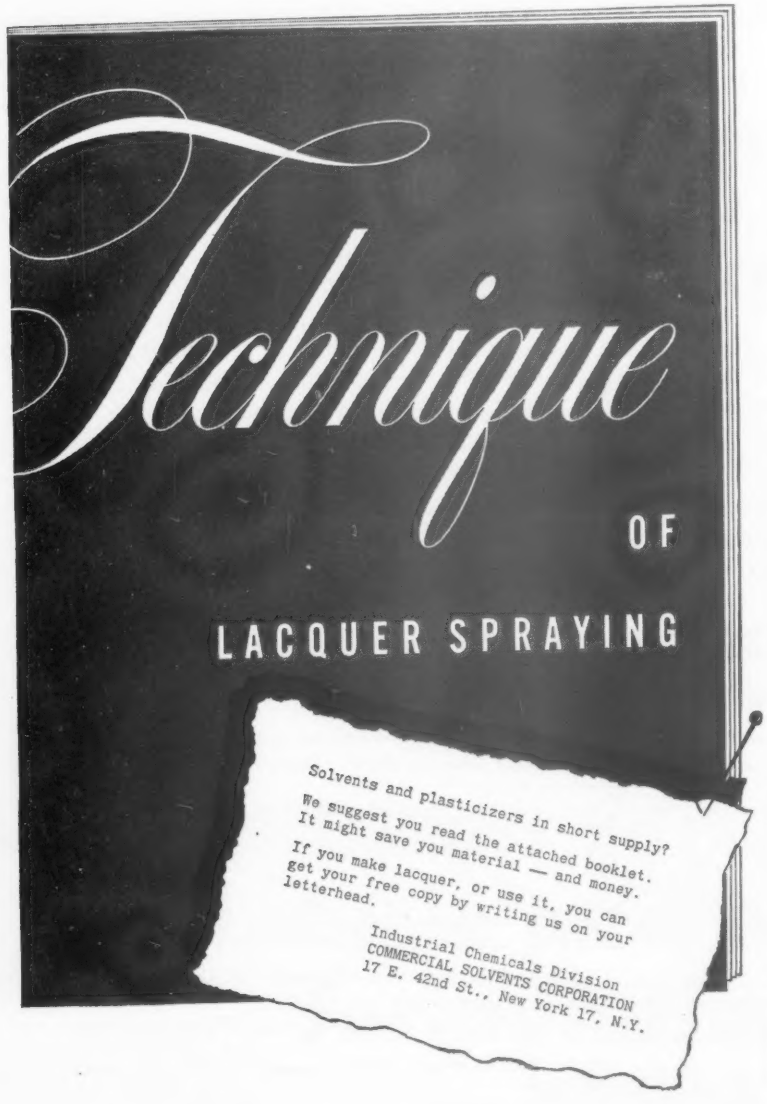
This specification covers an ethyl cellulose lacquer suitable for spray, dip and brush application to electrical and electronic equipment, components, and assemblies to render them resistant to moisture and fungus growth. Its greatest use is as a final overall spray application to assembled units where the slower drying, darker varnish cannot be tolerated.

Bureau of Ordnance Specification 52V24(Ord): Varnish, Melamine, Moisture- and Fungus-Resistant (Baking).

This specification covers a melamine-alkyd baking varnish suitable for spray, dip and brush application to phenolic materials used in electrical and electronic equipment, components, and assemblies in order to increase arc resistance and to render them more resistant to moisture and fungus growth. Its greatest use is to improve the properties of phenolic parts such as terminal strips.

Bureau of Ordnance Specification 52L21(Ord): Lacquer, Cable, Fungus-Resistant.

This specification covers a cellulosic ester lacquer suitable for spray, dip and brush application to cable (hook-up wire) used in electrical and electronic equipment, components, and assemblies in order to render them more resistant to moisture and fungus growth. Its greatest use is to improve the properties of cotton-braid covered hook-up wire. The cotton is very susceptible to fungus growth and is not suitable for use where conditions are favorable to fungus growth unless the cable is treated with a fungistatic cable lacquer such as is specified by this specification. Nylon-jacketed hook-up wire is preferred and used wherever possible.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CALENDAR OF EVENTS

Jan. 15–18. Plant Maintenance Show, Auditorium, Cleveland, Ohio.

Jan. 18–20. Society of Plastics Engineers, National Technical Conference, Statler Hotel, N. Y.

Mar. 5–9. A.S.T.M., Committee Week and Spring Meeting, Netherland Plaza Hotel, Cincinnati, Ohio.

Mar. 7–9. Southern Paint and Varnish Production Club Meeting, Buena Vista Hotel, Biloxi, Miss.

Mar. 13–16. Annual Conference of the National Association of Corrosion Engineers, Hotel Statler, N. Y.

June 18–22. A.S.T.M. Annual Meeting, Chalfonte - Haddon Hall, Atlantic City, N. J.

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PERFORMANCE: % of above mill charge reduced to pass through 100 mesh screen, 4 hrs. grinding time	30.00%	55.00%

* This increase in weight of the mill charge after grinding represents material ground off the porcelain balls and incorporated as contamination in the mill charge.
** Almost zero, but extremely difficult to measure.

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TECHNICAL Bulletins

DRUM LININGS

Linings for steel drums and pails to protect a wide variety of products during shipment and temporary storage are described in a 12-page booklet entitled "The Inside Story of Protective Linings for Steel Containers," issued by The Glidden Company of Cleveland, 11001 Madison Ave., Cleveland 2, Ohio.

The booklet describes protective linings manufactured by The Glidden Company for drums and pails for packaging animal and vegetable oils and fatty acids, products of oil refiners, strong solvents, food products, and miscellaneous products, including soaps, stains, water-thinned paints, resins, paint and varnish removers, formaldehyde, and sulphuric and other acids.

TALC SPECIFICATIONS

Due to new developments in their production and to improved laboratory research methods, the Sierra Talc & Clay Co. have found it advisable to revise two previous bulletins recently issued. These are: PT-9 on Government Specifications for Talc (Magnesium Silicate) replacing PT-5, and PT-10 on Specifications, Properties and Recommendations replacing PT-6.

CONTAINER COATINGS

Government publication on container coatings gives some 150 patents and papers on the various types of coatings for containers. All material included has been published since 1941. Report PB 100 583 may be obtained from the Office of Technical Service, Washington 25, D. C. Price $1.25.

PHOSPHATIZING SPECS

Specification chemicals for the Government and its contractors in regard to phosphating and rust-proofing treatments for various metals are tabulated neatly in 10½ × 4¼ inch card issued by the American Chemical Paint Co., Ambler, Pa.

WITCO REPORTS

Report S-3 "Witco Stabilizers and Lubricants for Plastics" which is a reference sheet designed to acquaint formulators with general information and the important properties of the Witco stabilizers and lubricants for polyvinyl chloride plastics.

Report M-11 "Witco Stearates for Protective Coatings" gives information on complete line of metallic stearates for the protective coatings industries . . . aluminum, calcium, and zinc. The report allows the formulator to find the metallic group best suited for his purpose.

Report P-13 "Witco 24% Lead Naphthenate" covers the properties of the Witco 24% lead naphthenate which are especially important to the paint industry.

Write to Witco Chemical Company, 295 Madison Avenue, New York 17, N. Y. for copies of these reports.

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SUBJECT INDEX for VOLUME XXX
January–December, 1950

	No.	Page
A.S.T.M. Report, Paint Testing	4	11
Alkyds, Tetrachloro Phthalic Anhydride in	1	6
Alkyl-Titanates, A Review of Developments of	8	10
Alkyl Starch	6	17
Amino Resins	5	10
Baking Industry, Selecton of Paint in	8	16
Battelle Memorial Institute, Coatings Research at	9	10
Chemical Analysis of Paint	3	12
Coating Research at Battelle Memorial Institute	9	10
Coating Technology, Phenolic Resins in	2	6
Consistency, Properties of	8	14
Corrosion Engineers Convention, Abstract of Papers	5	8
Dicyclopentenyl Alcohol	7	11
Drying, Evaluation of	11	19
Drying Properties of Soft Oils, Improving	2	12
Emulsion Paints, Literature Survey on	1	9
Emulsion, Polymerizing in Aqueous	2	5
Emulsions, Polystyrene	7	8
Evaluation of Protective Coatings		
Part One—Propertes of Packaged Paint	5	14
Part Two—Properties of Consistency	8	14
Part Three—Fineness of Grind	10	14
Evaluation of Underwater Paints for Steel Surface	4	7
Film Formation	11	24
Filters	10	12
Fineness of Grind	10	14
Fire Extinguisher System, Automatic	6	14
Fungicidal Varnishes and Lacquers	12	8
Graphite as a Black Pigment		
Part One	2	11
Part Two	3	11
Grinding Balls, Alloy Cast Iron	9	17
International Technical Developments		
United States	11	10
England	11	14
Belgium	11	19
France	11	21
Switzerland	11	24
The Netherlands	11	28
Denmark	11	32
Germany	11	40
Italy	11	44
Canada	11	46
South Africa	11	49
Japan	11	51
Jar Mills	8	8
Lacquers, Hot		
Part One	10	8
Part Two	12	13
Lacquer Plant, Wolverine Finishes Corp.	5	16
Mildew on Painted Surfaces, Diagnosis of	6	12
Organic Coatings, Testing Techniques and Uses of Equipment for Evaluating		
Part One	6	8
Part Two	7	12
Packaged Paint, Properties of	5	14
Paint in the Baking Industry, Selection of	8	16
Paint, Chemical Analysis of	3	12
Paints, Evaluation of Underwater for Steel Surfaces	4	7
Phenolic Resins in Coating Technology	2	6
Phenolic Resins, Straight and Modified	6	15
Pigment, Graphite as a Black		
Part One	2	11
Part Two	3	11
Plant, (Lacquer), Pyrolac's	12	6
Plasticizers, Tetrachloro Phthalic Anhydride in	1	6
Polymerizing in Aqueous Emulsion	2	5
Polystyrene Emulsions	7	8
Rosin Ester	6	17
Rubber Base Paints		
Part One	3	8
Part Two	4	8
Part Three	12	15
Safety Training, Solvent	2	21
Soft Oils, Improving Drying Properties of	2	12
Solvent Safety Training	2	21
Solvents, Storage and Handling of	1	10
Steel Surfaces, Evaluaton of Underwater Paints for	4	7
Storage and Handling of Solvents	1	10
Styrene, Use of in Protective Coatings	9	14
Testing, Paint, A.S.T.M. Report	4	11
Testing Techniques and Uses of Equipment for Evaluating Organic Coatings		
Part One	6	8
Part Two	7	12
Tetrachloro Phthalic Anhydride in Alkyds and Plasticizers	1	6

AUTHOR'S INDEX for VOLUME XXX
January–December, 1950

	No.	Page
Anneveldt, J. J.		
South Africa, Technical Development	11	49
Arzens, Roger		
Belgium, Evaluation of Drying	11	19
Blom, A. V.		
Switzerland, Film Formation	11	24
Bogin, Charles		
Hot Lacquers		
Part One	10	8
Part Two	12	13
Brand, B. G.		
Coatings Research at Battelle	9	10
Christensen, Knud		
Denmark, Technical Development	11	32
Cook, George S.		
Evaluation of Protective Coatings		
Part One	5	14
Part Two	8	14
Part Three	10	14
DeLonge, Kenneth A.		
Grinding Balls of Alloy Cast Iron	9	17
Dunbar, E. M.		
Wolverine Finishes Lacquer Plant	5	16
Fearnley, George		
Canada, Technical Development	11	46
Goll, Milton		
Diagnosis of Mildew on Painted Surfaces	6	12

Hokstra, J.
The Netherlands, Technical Development .. 11 28
Husse, W.
Evaluation of Underwater Paints for Steel Surfaces 4 7
Iwai, Shinji
Japan, Technical Development 11 51
Jackson, Stanley M.
Selection of Paint in the Baking Industry 8 16
Jones, C. L.
Storage and Handling of Solvents 1 10
Kronstein, Max
Alkyl-Titanates 8 10
Letsky, B. M.
England, Technical Development 11 14
Maas, Walter B.
Straight and Modified Phenolic Resins 6 15
McCullough, K. V.
Polystyrene Emulsions 7 8
Mehta, D. J.
Tetrachloro Phthalic Anhydride in Alkyds and Plasticizers 1 6
Michael, T. H. Glynn
Styrene in Protective Coatings 9 14
Miller, John O.
Jar Mills 8 8
Miller, Joseph
Pyrolac's Plant 12 6
Moore, John C.
United States, Technical Development 11 10
Mueller, E. R.
Coatings Research at Battelle 9 10
Myers, Rawdon
Filters 10 12
Pagani, Dante
Italy, Technical Development 11 44
Payne, H. F.
Tetrachloro Phthalic Anhydride in Alkyds and Plasticizers 1 6
Phair, R. J.
Testing Techniques for Evaluating Organic Coatings
Part One 6 8
Part Two 7 12
Rabaté, Henri
France, Technical Development 11 21
Reich, George
Graphite as a Black Pigment
Part One 2 11
Part Two 3 11
Rice, H. L.
Improving Drying Properties of Soft Oils 2 12
Rubber Base Paints
Part One 3 8
Part Two 4 8
Part Three 12 15
Ruggeri, Sam
Fungicidal Varnishes and Lacquers 12 8
Thurmond, C. D.
Amino Resins 5 10
Vedda, V. H.
Phenolic Resins in Coating Technology 2 6
Zeidler, Gerhard
Chemical Analysis of Paint 3 13
Germany, Technical Development 11 40

ADVERTISER'S INDEX

Abbé Engineering Co. 26
Advance Solvents & Chemical Corp. .... Nov.
American Zinc Sales Co. .... 3rd Cover
Bakelite Div., Union Carbide & Carbon Corp. .... Nov.
Baker & Adamson Products, General Chemical Division, Allied Chemical & Dye Corp. 3
Barrett Div., Allied Chemical & Dye Corp. 26
Binney & Smith Co. .... Back Cover
Carbide & Carbon Chemicals Div., Union Carbide & Carbon Corp. 24
E. W. Colledge, G.S.A., Inc. .... Nov.
Commercial Solvents Corp. 30
Concord Mica Corp. 31
The English Mica Co. 34
Falk & Co. .... Nov.
W. C. Hardesty Co. .... Nov.
Hellige, Inc. 23
Hercules Powder Co. 25
J. M. Lehmann Co., Inc. .... Nov.
Magnetic Pigment Div., Columbian Carbon Corp. 17
McCloskey Varnish Co. 27
Newport Industries, Inc. .... Front Cover
Nuodex Products Co., Inc. .... Nov.
Palmer-Shile Co. .... Nov.
Pan American Refining Corp., Pan American Chemicals Div. .... Nov.
Photovolt Corp. 26
Reichhold Chemicals, Inc. .... 2nd Cover
Charles Ross & Son Co. .... Nov.
Shell Chemical Corp. 28, 29
Shell Oil Co. 4
Sindar Corp. 23
Sun Oil Co. 32
Union Carbide & Carbon Corp., Carbide & Carbon Chemicals Div. 24
Bakelite Div. .... Nov.
United Carbon Co., Inc. 23
U. S. Industrial Chemicals, Inc. 19
U. S. Stoneware Co. 31
Velsicol Corp. 21
C. K. Williams & Co. .... Nov.

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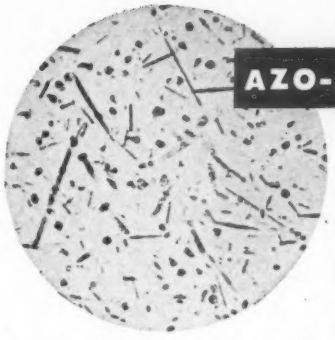

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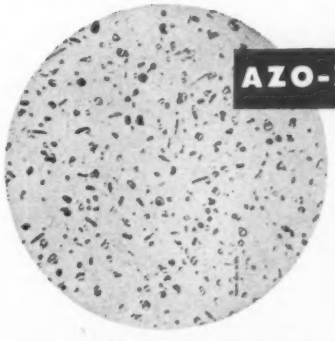

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	GRADE	BLACKNESS INDEX
CHANNEL BLACKS	Neo Spectra Mark I	240
	*Neo Spectra Mark II	220
	Super Spectra	216
	Neo Spectra Mark III	194
	*Superba	191
	*Excelsior	166
	No. 140 Black	160
FURNACE BLACKS	*Statex K-12	157
	*Statex B-12	136
	*Statex	118
	*Molacco	95
	*Beaded form also available	58

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